03630.000247. PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	:	Examiner: J. Sherrill
TODD NEWMAN, et al.	)	
	:	Group Art Unit: 2622
Application No.: 09/443,796	)	
	:	
Filed: November 19, 1999	)	
	:	
For: ADJUSTMENT OF COLOR APPEARANCE MODELS	)	
	:	January 8, 2003

Commissioner for Patents
Washington, D.C. 20231

1-14-03

RESPONSE TO OFFICIAL ACTION

Sir:

This application has been carefully reviewed in light of the Office Action dated October 25, 2002. Claims 1 to 72 remain in the application, of which Claims 1, 19, 37 and 55 are independent. Reconsideration and further examination are respectfully requested.

Applicants wish to thank the Examiner for the indication that Claims 5, 23, 41 and 59 would be allowable if rewritten into independent form. Applicants have chosen not to rewrite the claims at this time since the base claims for each of Claims 5, 23, 41 and 59 are believed to be allowable for at least the reasons set forth below.

Claims 1 to 4, 6 to 12, 14, 16, 18 to 22, 24 to 30, 34, 36 to 40, 42 to 48, 50, 52, 54 to 58, 60 to 66, 68, 70 and 72 were rejected under 35 U.S.C. § 103(a) over U.S.

Patent No. 6,281,984 (Decker), and Claims 13, 15, 17, 31, 33, 35, 49, 51, 53, 67, 69 and 71 were rejected under § 103(a) over Decker in view of U.S. Patent No. 5,073,818 (Iida). The rejections are respectfully traversed and the Examiner is requested to reconsider and withdraw the rejections after carefully considering the following points.

The present invention concerns adjustment of color appearance models. According to the invention, a forward mapping of sample colors is performed from a device-dependent space (such as CMY) to a device-independent color appearance space (such as Jab, where J is lightness, a is hue and b is chroma). However, a forward mapping without further adjustments can often lead to inaccuracies since device-neutrals, also perceived as neutral by a viewer, do not always coincide with the neutral axis of the color appearance space. As such, the invention obtains mismatch values for the perceived device-neutrals, where each mismatch value is a difference between a forward mapped value for the device-neutral and a neutral axis of the color appearance space. The mismatch values are then used to create an adjusted forward mapping of the device-independent values for each lightness level of the device-neutrals. As a result, the mappings of perceived device-neutrals are adjusted so as to correspond with the appearance space neutral axis.

With specific reference to the claims, Claim 1 is a method for adjusting the representation of a device's color gamut in color appearance space, comprising the steps of performing forward mapping of sample colors from a device-dependent space to a device-independent color appearance space to obtain forward-mapped device-independent values, obtaining mismatch values for perceived device-neutrals, each mismatch value being a difference between a forward mapped value for the device-neutral and a neutral axis of the

color appearance space, and adjusting each forward-mapped device-independent value by utilizing the obtained mismatch value for each corresponding lightness level of device-neutrals in order to obtain an adjusted forward mapping.

Independent Claims 19, 37 and 55 are computer-executable process steps, apparatus, and computer-readable medium claims, respectively, that substantially correspond to Claim 1.

The applied art, alone or in combination, is not seen to disclose or to suggest the features of Claims 1, 19, 37 and 55, and in particular, is not seen to disclose or to suggest at least the feature of obtaining mismatch values for perceived device-neutrals, each mismatch value being a difference between a forward mapped value for the device-neutral and a neutral axis of the color appearance space. As a consequence therefore, the applied art is also not seen to disclose or to suggest at least the feature of adjusting each forward-mapped device-independent value by utilizing the obtained mismatch value for each corresponding lightness level of device-neutrals in order to obtain an adjusted forward mapping.

Decker is seen to disclose mapping one CMYK space (such as the SWOP standard) to another CMYK space (such as a specific printer). This is done by obtaining input L*a*b* values for the standard black (K_{STD}), where the a* and b* values are assumed to be zero. Then, using the input luminance (L*), an output black (K'_p) of the same luminance as the standard black (K_{STD}) is obtained, with this black (K'_p) then becoming the final output black. The final output black (K'_p) is used to print a sampling of CMYs, from which L*a*b* values are then obtained. Then the output CMYK that most closely matches the input L*a*b* value is used as the final output CMYK value. Therefore, while Decker

maps the input K to L*, Decker then merely finds an output L* that most closely matches the input, but does not find a difference in a chroma plane between a device neutral and the neutral axis. Thus, Decker does not obtain mismatch values for perceived device-neutrals, each mismatch value being a difference between a forward mapped value for the device-neutral and a neutral axis of the color appearance space, much less adjust each forward-mapped device-independent value by utilizing the obtained mismatch value for each corresponding lightness level of device-neutrals in order to obtain an adjusted forward mapping.

The Office Action alleged that Decker's reference numerals 108 and 110 of Figures 1A and 1B, and column 10, line 66 to column 11, line 26, disclose "obtaining mismatch values for perceived device-neutral[s]." However, Applicants submit that this section merely describes a forward mapping process of printing out black patches of varying luminance, measuring the L*, a*, and b* values of each patch, and creating a look-up table for transforming the standard CMYK values to the printer C'M'Y'K' values. Thus, Decker merely transforms standard values to printer values and has nothing whatsoever to do with perceived device-neutrals. Therefore, contrary to the allegation made in the Office Action, this section does not disclose or suggest obtaining mismatch values for perceived device-neutrals, each mismatch value being a difference between a forward mapped value for the device-neutral and a neutral axis of the color appearance space.

Moreover, Decker teaches away from the present invention. Referring to column 9, lines 27 to 30, Decker states: "Since the values of a* and b* are approximately zero for the greyscale black patches, only the L* value is used for the greyscale black

patches." This teaching of Decker assumes that a* and b* are near zero and as a result, any mismatch between the a* and b* values of perceived device-neutrals from the device-neutral axis is assumed to be zero. Therefore, those skilled in the art would be lead away from the solution of the present invention (i.e., obtaining mismatch values for perceived device-neutrals, each mismatch value being a difference between a forward mapped value for the device-neutral and a neutral axis of the color appearance space) because Decker states that no mismatch is present. Accordingly, the present invention of Claims 1, 19, 37 and 55 could not have been obvious over Decker.

Iida is seen to disclose recognizing that device white values may be different for different media and that these whites may not fall upon the neutral axis. As a result, Iida proposes a method to align the white points. However, Iida fails to address a critical issue that chromaticity of gray values shifts along the device neutral axis. In fact, Iida's solution is unnecessary if one uses a color appearance model, such a CIECAM97s, in the typical manner. With this method, the device white point is usually set as the adapted white point so as to assure that for each medium, device white will map to a lightness of 100 and a chroma of 0. However, this does not solve the problem of chromatic device neutrals, which is one aim of the present invention. Therefore, Iida is not seen to add anything to overcome the deficiencies of Decker and is also not seen to disclose or to suggest at least the feature of obtaining mismatch values for perceived device-neutrals, each mismatch value being a difference between a forward mapped value for the device-neutral and a neutral axis of the color appearance space. Nor is Iida seen to disclose or to suggest adjusting each forward-mapped device-independent value by utilizing the obtained

mismatch value for each corresponding lightness level of device-neutrals in order to obtain an adjusted forward mapping.

In view of the foregoing deficiencies of the applied art, independent Claims 1, 19, 37 and 55, as well as the claims dependent therefrom, are believed to be in condition for allowance and such action is respectfully requested at the Examiner's earliest convenience.

As a formal matter, Applicants thank the Examiner for returning a Form PTO-1449 from the November 19, 1999 Information Disclosure Statement, but note that one reference listed on page 3 thereof was not initialed. Applicants request that the Examiner initial the article to C.M. Howard listed on page 3 to indicate that the cited reference has been considered.

Applicants' undersigned attorney may be reached in our Costa Mesa, California office at (714) 540-8700. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

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